

East Coast Railway

Examination for the Group –C JE (Mechanical) Post

Date of examination: 28.06.2021

Total Marks : 150

Time : 2 Hrs

Please read the following instructions carefully before you begin to answer the questions

- Question Paper consists of 150 questions.
- All questions are objective type.
- There shall be 4 options against each question.
- Each question carries one mark. For every correct answer, 1 mark will be allotted to Examinee.
- No Negative marking is there for wrong answer. Examinee can attempt/answer all the questions.
- Qualifying mark is 60% or above.
- Cutting, overwriting, erasing or alteration of any type in answer will not be accepted and zero marks will be given for answering having correction/ overwriting.
- Examinee is advised to go through the complete questions within 15 min of start of examination for any doubts clarification.
- Only use blue or black ball point pen only. The use of pencil is not valid.
- The examinees are not allowed to bring mobile phones / calculator / electronic gadgets with them to the examination hall. Use of any paper, calculating machines and mobile phones etc. is completely prohibited and they will be disqualified for using it.
- Candidates using unfair means will be removed from the selection process.

SECTION : A

1. $100^2 \times 100^5 = 100^y$ The value of y is : []
 - a. 1
 - b. 1.5
 - c. 2
 - d. 7

2. Solve the linear equation: $3(x + 2) - 2(1 - x) = 4x + 5$ []
 - a. -1
 - b. 0
 - c. 1
 - d. 2

3. Peter's salary is twice Ann's salary and half of David's salary. Then the average salary of Ann and David is _____ Peter's salary. []
 - a. equal to
 - b. larger than
 - c. depends on salary
 - d. there is no correct answer

4. Ann and Kate have 80 dollars together. If Kate buys ice-cream for 5 dollars, then Kate will have double Ann's money. How much money does Ann have? []
 - a. \$20
 - b. \$25
 - c. \$40
 - d. \$50

5. Solve the inequality: $-7x - 1 \geq 13$ []
 - a) $[2, +\infty)$
 - b) $(7, +\infty)$
 - c) $(-\infty, -2]$
 - d) $(2, +\infty)$

6. Given: $a=b+2c$, $b=3c$. What is the average of numbers a , b and c ? []
 - a. $3c$
 - b. $1.5c$
 - c. $2c$
 - d. $2.5c$

7. In a forest $\frac{4}{7}$ of all the trees are conifer and the rest are leaf-bearing. Among the leaf-bearing trees $\frac{7}{15}$ are oak and $\frac{2}{3}$ of these oaks are new. There are 160 old oaks in the forest. How many trees in all are in the forest? []
 - a. 2400
 - b. 2800
 - c. 3200
 - d. 3600

8. The speed of one car is 20% less than the speed of a second car. What per cent more time does the first car need to travel the same route as the second car? []
 - a. 12.5%
 - b. 20%
 - c. 25%
 - d. 30%

9. Jim can fill a pool carrying buckets of water in 30 minutes. Sue can do the same job in 45 minutes. Tony can do the same job in $1\frac{1}{2}$ hours. How quickly can all three fill the pool together? []
a. 12 minutes
b. 15 minutes
c. 21 minutes
d. 23 minutes
10. If the average of three numbers is V . If one of the numbers is Z and another is Y , what is the remaining number? []
a. $ZY - V$
b. $Z/V - 3 - Y$
c. $Z/3 - V - Y$
d. $3V - Z - Y$
11. Find $x+y$, if: $2x+3y=8$ and $3x+5y=13$ []
a. 1.5
b. 2
c. 2.5
d. 3
12. Solve the inequality:
 $2x - 1 \geq x + 10$ []
a) $(-\infty, 9)$
b) $(9, +\infty)$
c) $(-\infty, -9]$
d) $[11, +\infty)$
13. Divide $x^3 - 3x^2 + 3x - 1$ by $x - 1$. []
a. $x^2 - 1$
b. $x^2 + 1$
c. $x^2 - 2x + 1$
d. $x^2 + 2x + 1$
14. Divide $x^2 - y^2$ by $x - y$. []
a. $x - y$
b. $x + y$
c. xy
d. $y - x$
15. Solve the quadratic equation: $x^2 + 4x + 4 = 0$ []
a. 0 and 1
b. 1 and 2
c. 2
d. -2
16. $12t - 10 = 14t + 2$. Find t []
a. -6
b. -4
c. 4
d. 6

17. The price of a book decreased from \$25 to \$20. By how many percent did the price decrease? []
a. 5
b. 10
c. 20
d. 25
18. A number is increased by 2 and then multiplied by 3. The result is 24. What is this number? []
a. 4 b. 6 c. 8 d. 10
19. After taking several practice tests, Brian improved the results of his GRE test by 30%. Given that the first time he took the test Brian had answered 150 questions correctly, how many correct answers did he answer in the second test? []
a. 105
b. 120
c. 180
d. 195
20. My father's age divided by 5 is equal to my brother's age divided by 3. My brother is 3 years older than me. My father's age is 3 less than 2 times my age. How old is my father? []
a. 34
b. 45
c. 56
d. 61
21. Look at this series: 36, 34, 30, 28, 24, ... What number should come next? []
A. 22
B. 26
C. 23
D. 20
22. Which word does NOT belong with the others? []
A. index
B. glossary
C. chapter
D. book
23. Paw : Cat :: Hoof : _____ ? []
A. Lamb
B. Horse
C. Elephant
D. Tiger
24. Melt : Liquid :: Freeze : []
A. Ice
B. Solid
C. Condense
D. Push

25. Which word does NOT belong with the others? []
A. wing
B. fin
C. beak
D. rudder
26. Look at this series: 7, 10, 8, 11, 9, 12, ... What number should come next? []
A. 7
B. 12
C. 10
D. 13
27. SCD, TEF, UGH, ____, WKL []
a. IJT
b. VIJ
c. CMN
d. UJI
28. Volumes of two cubes are in the ratio 8:27. Ratio of their surface area is []
A. 2 : 3
B. 3 : 2
C. 4 : 9
D. 9 : 4
29. 2,5,9,19,37,__ ? Missing number is : []
A. 73
B. 75
C. 76
D. 78
30. Reena is twice as old as Sunita. Three years ago, she was three times as old as Sunita. How old is Reena now ? []
A. 6
B. 7
C. 8
D. 12
31. Giant : Dwarf :: Genius : ? []
A. Wicked
B. Gentle
C. Idiot
D. Tiny
32. Botany : plants :: entomology : ? []
A. Snakes
B. Insects
C. Birds
D. Germs

33. ABCD: NPRT :: FGHI : ? []
- KLMN
 - OQRT
 - RTUW
 - SUWY
34. Chose the number pair which is different from others ? []
- 50-66
 - 32-48
 - 64-80
 - 63-77
35. Pointing to a photograph, a man said , " I have no brother or sister but that man's father is my father's son". whose photograph was it ? []
- His own
 - His son's
 - His father's
 - His nephew's
36. If you are facing north-east and move 10m forward, turn left and move 7.5m , then you are []
- North of your initial position
 - South of your initial position
 - East of your initial position
 - 12m from your initial position
37. You go north , turn right, then right again and then go to the left . in which direction are you now ? []
- North
 - South
 - East
 - West
38. Sam ranked ninth from the top and thirty eight from the bottom in a class . how many students are there in the class ? []
- 45
 - 46
 - 47
 - 48
39. In a class of 60, where girls are twice that of boys, Kamal ranked seventeenth from the top. If there are 9 girls a head of Kamal , how many boys are after him ? []
- 3
 - 7
 - 12
 - 23
40. Pointing towards a person, a man said to woman " his mother is the only daughter []

of your father" how is the woman related to that person ?

- A. Daughter
- B. Sister
- C. Mother
- D. Wife

41. The 'Father of Indian Space Program' is - []
A. Dr. A. P.J. Abdul Kalam
B. Dr. Vikram A. Sarabhai
C. Dr. K. Kasturirangan
D. Prof. Satish Dhawan
42. What is $C_{12}H_{12}O_{11}$ also known as - []
A. Sand B. Sugar C. Salt D. Clay
43. The planet Mars is also known as the _____. []
A. Morning star
B. Evening star
C. Red planet
D. Blue planet
44. The term Lok Sabha is normally []
A. 2 years
B. 4 years
C. 5 years
D. 7 years
45. The Mughal empire was founded by - []
A. Babur
B. Humayun
C. Akbar
D. Shah Jahan
46. Which of the following colored light has the lowest frequency? []
A. Green
B. Blue
C. Red
D. Violet
47. The system of judicial review in Indian constitution adopted from []
A. India
B. Germany
C. U.K.
D. U.S.A

48. What is the slogan of Indian Railways? []
A. lifeline of the nation
B. Nation's Road of Action
C. National Service Road
D. Others
49. The 'Ashes' series is played between which of the following countries? []
A. England and Australia
B. England and South Africa
C. Australia and New Zealand
D. New Zealand and West Indies
50. Which city has been called the financial capital of India? []
A. Mumbai
B. Delhi
C. Patna
D. Bangalore
51. Which poisonous gas was released in Bhopal Gas Tragedy? []
A. Methyl Isocyanide
B. Nitrous Oxide
C. Methyl Isocyanate
D. Cyanogen
52. The most common cause of anemia in our country is – []
A. Potassium deficiency
B. Calcium deficiency
C. Iron deficiency
D. Magnesium deficiency
53. The biological action in which Oxygen is free? []
A. Photosynthesis
B. Respiration and excretion
C. Respiration
D. Respiration and photosynthesis
54. Which of the following is the least polluting fuel? []
A. Hydrogen
B. Diesel
C. Kerosene
D. Coal
55. The best conductor of electricity is []
A. Aluminium
B. Wood

- C. Iron
- D. Silver

56. Who becomes the first person to declare as a fugitive economic offender under the new Fugitive Economic Offenders Act []
(a) Vijay Mallya
(b) Nirav Modi
(c) Lalit Modi
(d) Mehul Choksi
57. Which one Bank is not one of the three Banks that will be merged to form the third largest Bank in India []
(a) Vijaya Bank
(b) Bank of Baroda
(c) Indian Bank
(d) Dena Bank
58. Which country's company sends World's first privately funded mission to Moon []
(a) China
(b) USA
(c) Israel
(d) Australia
59. Which one country become the first country to receive the Indian COVID-19 vaccine []
(a) Maldives
(b) Bhutan
(c) Nepal
(d) Sri Lanka
60. Who wins the Australian Open men's single title in 2021 []
(a) Dominic Thiem
(b) Rafael Nadal
(c) Novak Djokovic
(d) Daniil Medvedev

SECTION : B

1. The friction experienced by a body, when in motion, is known as []
A. rolling friction
B. dynamic friction
C. limiting friction
D. static friction
2. Two balls of equal mass and of perfectly elastic material are lying on the floor. One of the ball with velocity v is made to struck the second ball. Both the balls []

after impact will move with a velocity

- A. v
 - B. $v/2$
 - C. $v/4$
 - D. $v/8$
3. The rate of change of momentum is directly proportional to the impressed force, and takes place in the same direction in which the force acts. This statement is known as []
- A. Newton's first law of motion
 - B. Newton's second law of motion
 - C. Newton's third law of motion
 - D. none of these
4. The minimum force required to slide a body of weight W on a rough horizontal plane is []
- A. $W \sin \theta$
 - B. $W \cos \theta$
 - C. $W \tan \theta$
 - D. none of these
5. The angular velocity (in rad / s) of a body rotating at N revolutions per minute is []
- A. $\pi N/60$
 - B. $\pi N/180$
 - C. $2\pi N/60$
 - D. $2\pi N/180$
6. A force acting on a body may []
- A. Introduce internal stresses
 - B. Retard its motion
 - C. Change its motion
 - D. All of the above
7. The coefficient of friction depends on []
- A. Area of contact
 - B. Shape of surfaces
 - C. Strength of surfaces
 - D. Nature of surface
8. Which of the following do not have identical dimensions ? []
- A. Momentum and impulse
 - B. Moment of a force and angular momentum
 - C. Torque and work
 - D. Kinetic energy and potential energy

- 9 Which of the following is not the unit of distance ? []
A. Angstrom
B. Milestone
C. Micron
D. Millimetre
- 10 When trying to turn a key into a lock, following is applied []
A. Coplanar force
B. Couple
C. Lever
D. Moment
- 11 D' Alembert's principle is used for []
A. Reducing the problem of kinetics to equivalent statics problem
B. Determining stresses in the truss
C. Stability of floating bodies
D. Designing safe structures
- 12 Which of the following is not the unit of pressure ? []
A. Kg/cm²
B. Newton
C. Atmosphere
D. Mm of wcl
- 13 The weight of a body is due to []
A. Centripetal force of earth
B. Gravitational force of attraction towards the centre of the earth
C. Forces experienced by body in atmosphere
D. Force of attraction experienced by particles
- 14 Strain is defined as the ratio of []
A. Change in volume to original volume
B. Change in length to original length
C. Change in cross-sectional area to original cross-sectional area
D. Any one of the above
- 15 Hooke's law holds good upto []
A. Yield point
B. Limit of proportionality
C. Breaking point
D. Elastic limit
- 16 The unit of Young's modulus is []
A. Mm/mm
B. Kg/cm
C. Kg
D. Kg/cm²
- 17 The materials having same elastic properties in all directions are called []
A. Ideal materials
B. Uniform materials

C.Isotropic materials
D.Paractical materials

- 18 Modulus of rigidity is defined as the ratio of []
 A.Longitudinal stress and longitudinal strain
 B.Volumetric stress and volumetric strain
 C.Lateral stress and lateral strain
 D.Shear stress and shear strain
- 19 For steel, the ultimate strength in shear as compared to in tension is nearly []
 A.Same
 B.Half
 C.One-third
 D.Two-third
- 20 Which of the following materials is most elastic []
 A.Rubber
 B.Plastic
 C.Brass
 D.Steel
- 21 The property of a material by virtue Of which it can be beaten or rolled into plates []
 is called
 A.Malleability
 B.Ductility
 C.Plasticity
 D.Elasticity
- 22 If a material expands freely due to heating it will develop []
 A.Thermal stresses
 B.No stress.
 C.Bending
 D.Compressive stress –
- 23 The ratio of lateral strain to the linear strain within elastic limit is known as []
 A.Young's modulus
 B.Poisson's ratio.
 C.Modulus of rigidity
 D.Modulus of elasticity
- 24 In a compression test, the fracture in cast iron specimen would occur along []
 A.The axis of load
 B.Perpendicular to the axis of load
 C.An oblique plane
 D.Would not occur
- 25 A beam is loaded as cantilever, If the load at the end is increased, failure will occur []
 A.In the middle
 B.At the tip below the load
 C.At the support
 D.Anywhere

26. The distance between the centres of two consecutive rivets in the same row is called []
A. Lead
B. Lap
C. Pitch
D. Spacing
27. A closed system is one in which []
A. Mass does not cross boundaries of the system, though energy may do so
B. Mass crosses the boundary but not the energy
C. Neither mass nor energy crosses the boundaries of the system
D. Both energy and mass cross the boundaries of the system
28. Intensive property of a system is one whose value []
A. Depends on the mass of the system, like volume
B. Does not depend on the mass of the system, like temperature, pressure
C. Is not dependent on the path followed but on the state
D. Is dependent on the path followed and not on the state
29. Heat and work are []
A. Point functions
B. System properties
C. Path functions
D. Intensive properties
30. According to first law of thermodynamics []
A. Work done by a system is equal to heat transferred by the system
B. Total internal energy of a system during a process remains constant
C. Internal energy, enthalpy and entropy during a process remain constant
D. Total energy of a system remains constant
31. In an isothermal process, the internal energy []
A. Increases
B. Decreases
C. Remains constant
D. First increases and then decreases
32. Carnot cycle has maximum efficiency for []
A. Reversible engine
B. Irreversible engine
C. New engine
D. Petrol engine
33. Compressed air coming out from a punctured football []
A. Becomes hotter
B. Becomes cooler
C. Remains at the same temperature
D. None of the above
34. Thermal power plant works on []
A. Carnot cycle

- B. Joule cycle
C. Rankine cycle
D. Otto cycle
35. Otto cycle consists of following four processes []
A. Two isothermals and two isentropics
B. Two isentropics and two constant volumes
C. Two isentropics, one constant volume and one constant pressure
D. Two isentropics and two constant pressures
36. The material used for coating the electrode is called []
A. Protective layer
B. Flux
C. Slag
D. Deoxidiser
37. Following gases are used in tungsten inert gas welding []
A. Hydrogen and oxygen
B. Argon and helium
C. Argon and neon
D. Helium and neon
38. Fluxes are used in welding in order to protect the molten metal and the surfaces to be jointed from []
A. Oxidation
B. Carburising
C. Dirt
D. Distortion and warping
39. Arc stability is better with []
A. AC welding
B. DC welding
C. Both AC and DC welding
D. Specially designed wave forms
40. The following welding process uses consumable electrode []
A. TIG
B. MIG
C. Thermit
D. Laser
41. Electrode gets consumed in the following, welding process []
A. Gas
B. Resistance
C. Thermit
D. Arc
42. In a diesel engine, the fuel is ignited by []
A. Spark
B. Injected fuel
C. Heat resulting from compressing air that is supplied for combustion

D. Igniter

- 43 Supercharging is the process of []
A. Supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere
B. Providing forced cooling air
C. Injecting excess fuel for raising more load
D. Supplying compressed air to remove combustion products fully
- 44 Pick up the false statement []
A. Thermal efficiency of diesel engine is about 34%
B. Theoretically correct mixture of air and petrol is approx 15 : 1
C. Diesel engines are compression ignition engines
D. S.I. engines are quality governed engines
- 45 If the temperature of intake air in IC engines is lowered, then its efficiency will []
A. Increase
B. Decrease
C. Remain same
D. Increase upto certain limit and then decrease
- 46 For the same compression ratio []
A. Otto cycle is more efficient than the Diesel
B. Diesel cycle is more efficient than Otto
C. Both Otto and Diesel cycles are equally efficient
D. Which is more efficient would depend on engine capacity
- 47 The process of breaking up or a liquid into fine droplets by spraying is called []
A. Vaporization
B. Atomisation
C. Ionisation
D. Injection
- 48 Which of the following medium is compressed in a Diesel engine cylinder []
A. Air alone
B. Air and fuel
C. Air and lub oil
D. Fuel alone
- 49 The term scavenging is generally associated with []
A. 2-stroke cycle engines
B. High efficiency engines
C. Aeroplane engines
D. Diesel engines
- 50 The cam shaft of a four stroke LC. engine. running at 1500 rpm will run at []
A. 1500 rpm
B. 750 rpm

- C.3000 rpm
D.Any value independent of engine speed
- 51 The crystal of alpha iron is []
A.Body centred cubic
B.Face centred cubic
C.Hexagonal close packed
D.Cubic structure
- 52 Which of the following constituents of steels is softest and least strong []
A.Austenite
B.Pearlite
C.Ferrite
D.Cementite
53. Slow plastic deformation of metals under a constant stress is known as []
A.Creep
B.Fatigue
C.Endurance
D.Plastic deformation
54. Ductility of a material can be defined as []
A.Ability to undergo large permanent deformations in compression
B.Ability to recover its original form
C.Ability to undergo large permanent deformations in tension
D.All of the above
- 55 Materials after cold working are subjected to following process to relieve stresses []
A. Hot working
B.Tempering
C.Normalising
D.Annealing.
- 56 The elastic stress strain behaviour of rubber is []
A.Linear
B.Non-linear
C.Plastic
D.No fixed relationship.
- 57 The unit of power in S.I. units is []
A.Newton metre
B.Watt
C.Joule
D.Kilogram-metre/sec
- 58 Effect of a force on a body depends upon []
A.Magnitude

- B.Direction
C.Position or line of action
D.All of the above
- 59 Which of the following is a vector quantity []
A.Energy
B.Mass
C.Momentum
D.Angle
- 60 Which of the following is not a vector quantity []
A.Weight
B.Velocity
C.Acceleration
D.Force
- 61 Heating of dry steam above saturation temperature is known as []
A.Enthalpy
B.Superheating
C.Supersaturation
D.Latent heat
- 62 Adiabatic process is []
A.Essentially an isentropic process
B.Non-heat transfer process
C.Reversible process
D.Constant temperature process
- 63 Water boils when its vapour pressure []
A.Equals that of the surroundings
B.Equals 760 mm of mercury
C.Equals to atmospheric pressure
D.Equals the pressure of water in the container
64. The increase in pressure []
A.Lowers the boiling point of a liquid
B.Raises the boiling point of a liquid
C.Sloes not affect the boiling point of a liquid
D.Reduces its volume
- 65 One ton of refrigeration is equal to the refrigeration effect corresponding []
to melting of 1000 kg 'of ice
A.In 1 hour
B.In 1 minute
C. in 24 hours
D.In 12 hours

- 66 The moisture in a refrigerant is removed by []
A.Evaporator
B.Safety relief valve
C.Dehumidifier
D.Driers
- 67 Decibel (db) is a unit used to measure []
a. Light
b. Sound
c. Frequency
d. None of the above
- 68 Rating of a domestic refrigerator is of the order of []
A.0.1 ton
B.5 tons
C.10 tons
D.40 tons
69. Class-A fire consists of fire due to []
a. Wood
b. Oil
c. Transformer
d. Chemical
- 70 Air refrigeration operates on []
A.Carnot cycle
B.Brayton cycle.
C.Rankine cycle
D.Erricson cycle
- 71 The number of isotopes of hydrogen are []
A.1
B.2
C.3
D.4
- 72 Lathe mandrels can be termed as a? []
a. Gauge
b. Jig
c. Template
d. Fixture
- 73 The energy produced by a thermal reactor of same size as a nuclear reactor is []
A.Almost same
B.Slightly more
C.Slightly less
D.Much less
- 74 The most commonly used moderator in nuclear plants is []
A.Heavy water

- B.Graphite
- C.Graphite and concrete
- D.Deuterium

- 75 The mass number of a substance represents the sum of total number of []
A.Protons and neutrons in an atom
B.Protons and electrons in an atom
C.Neutrons and electrons in an atom
D.Protons and neutrons in a nucleus
- 76 Moderator in nuclear plants is used to []
A.Reduce temperature
B.Extract heat from nuclear reaction
C.Control the reaction
D.Cause collision with the fast moving neutrons to reduce their speed.
- 77 The following present serious difficulty in designing reactor shield []
A.Alpha particles
B.Beta particles
C.Thermal neutrons
D.Fast neutrons and gamma rays
- 78 The endurance limit of a material with finished surface in comparison to []
rough surface is
A.More B. Less C. Same
D.More or less depending on quantum of load
- 79 Stress concentration is caused due to []
A.Variation in properties of material from point to point in a member
B.Pitting at points or areas at which loads on a member are applied
C.Abrupt change of section
D.All of the above
- 80 In testing a material for endurance strength, it is subjected to []
A.Static load
B.Impact load
C.Static as well as dynamic load
D.Completely reversed load
- 81 Shear stress theory is applicable for []
A.Ductile materials
B.Brittle materials
C.Elastic materials
D.All of the above
- 82 The function of a washer is to []
A.Provide cushioning effect

- B. Provide bearing area
C. Absorb shocks and vibrations
D. Provide smooth surface in place of rough surface
83. Which one of the following threads, is used on mechanical jack []
a. Acme b. Square c. Buttress d. B.S.F
84. Rivets are generally specified by []
A. Thickness of plates to be riveted
B. Length of rivet
C. Diameter of head
D. Nominal diameter
85. Eye bolts are used for []
A. Foundation purposes
B. Transmission of power
C. Absorbing shock and vibrations
D. Lifting and transportation of machines and cubicles
86. A fluid is said to be ideal, if it is []
A. Incompressible
B. Inviscous and incompressible.
C. Viscous and incompressible
D. Inviscous and compressible
87. Property of a fluid by which its own molecules are attracted is called []
A. Adhesion
B. Cohesion
C. Viscosity
D. Compressibility
88. Which of the following is dimensionless []
A. Specific weight
B. Specific volume
C. Specific speed
D. Specific gravity
89. The tendency of a liquid surface to contract is due to the following property []
A. adhesion
B. surface tension
C. more
D. cohesion
90. Surface tension has the units of []
A. Newtons-Sec/meter
B. Newtons/meter²
C. Newtons/meter
D. Newtons